iv) determine the extent of high-pressure alteration involving recrystalization of constituent ferromagnetic minerals,

v) determine chemical alteration that may have changed the mineralization of the pre-existing rock,

vi) discern the relative attitude of areas of quiescently laid sedimentary rock and sediments based on the orientation of their fine ferromagnetic minerals orientating themselves to the existing earths magnetic field at the time of sedimentation,

vii) extrapolate paleo-magnetic measurements as an aid to stratigraphic correlation and tectonic studies.

**REMARKS**

In reference to the examiner's office action report dated 04/19/2005, and in particular reference to;

Page 3, paragraph 4 wherein,

Crawfis teaches a method of visualization of a 3D vector field on a 2D surface. The method used by Crawfis differs from that used by Komarechka hence is not inclusive of Komarechka's method.

And whereas,

Mueller uses a standard 2D projection of 3D vector data on a plane surface of a particular orientation to illustrate symmetry about a particular axial direction. This is not a novel concept and has been used innumerable times since drafting methods have been conceived. Mueller does not illustrate a means of selectively extracting vectors of a particular orientation or selecting vectors that have symmetry about a particular orientation either individually or cumulatively. Mueller selected a particular plane that best exemplified the data to illustrate a particular symmetry

about a particular axis. The data set used by Mueller was very simple and did not require much effort to determine the symmetry present. In a 3D data set of hundreds of thousands of vectors with multiple dipoles of varying orientation, determining particular axial symmetries would be much more difficult. The Komarechka methodology has the means of locating this axial symmetry very efficiently with one query. Mueller does not make any claim as to how his particular axial orientation was determined but merely illustrates that it exists.

While mention is made of figure 1 &2 on pg 658 as 'clearly' illustrating three dimensional vectors, in both of these cases -which are standard projection views- one cannot discern the degree of foreshortening of the vectors nor can the orientation of each vector be quantitatively determined.

The Komarechka methodology can show the orientation quantitatively by its unique user selectable color-coding hence vectors of like orientation can be identified. Consequentially a determination can be made of their relative intensities, regardless of the vector position and orientation in 3D space.

Notwithstanding minor language amendments to Claim 1, the applicant verily believed the claim remains patentable over both Mueller and Crawfis in view of the above remark,

<u>and Page 4, paragraph 1 wherein,</u>

It is agreed that both Kerekes and Mueller teach the collection of three-dimensional information and Crawfis focuses on visualization. These concepts are common knowledge in the trade and are the basis of the data collected and used for many visualization applications. However, the applicant believes in the need to include such a step whereby failing to include said step would minimize the clarity in the whole of the present method,

and Page 5, paragraph 1 wherein,

It is agreed that all three references teach the display of vector fields on the screen of a computer monitor, e.g. a two dimensional display, however none of these references has the capability of rapidly evaluating the orientation and intensity of these vector fields in the same manner taught by Komarechka,

and Page 5, paragraph 2 wherein,

It is also agreed that Kerekes (as well as others) teach the calibration of equipment for three-dimensional measurements. This methodology is well known in the industry. The examiner expresses that "calibrating said three-dimensional information can [be] performed at any time during the process". However, in the Komarechka method, it is of importance to calibrate the three-dimensional information prior to the determination of its orientation and intensity since visualization of said data depends on display resolution thus enabling the user to increase or decrease said display resolution.
Regarding calibration of data after processing and visualization: The result of quantitatively illustrating the variation in orientation allows for the rapid visualization of vectors having erratic orientations not typical of anticipated values. The recent use of a Komarechka visualization method on one data set led the supplier of this data to recognize a problem and to correct it by enhancing their correction factor for aircraft crabbing orientation,

and Page 5, paragraph 3 wherein,

Mueller -in figs.1 & 2- illustrates a view of a vector field produced by a prior art application. Although it may be said that color can be applied to these vectors, none was. While the applicant is aware of color being applied on a linear scale to vector magnitude, color applied to orientation is not generally done. Furthermore the unique easy manner in which color may be assigned to specific orientation as described in the Komarechka methodology greatly facilitates the understanding and

symmetrical relationship of this orientation especially in vector fields having very large data sets having. Further more the Komarechka methodology as described is very amenable to quick searching and discrimination of desired vector orientations. The illustrations shown by Mueller emphasize a symmetry based on a plane orthogonal to some axis of symmetry. In a more complex field consisting of multiple dipoles, the ability to illustrate a particular symmetry about pre-defined axis orientation would be difficult using the methodology taught by the above references. Figure 2 of Mueller shows that there exists symmetry about a particular magnetizing direction. The Komarechka methodology can be used to locate all such symmetries in the vector field having similar axial orientations. All of the illustrations concerning the use of color in Vector fields as mentioned in Crawfis pg 60 are merely linear mapping of hue as a function of some scalar, e.g. altitude (z value), % cloudiness, etc. The color mapping methodology in Komarechka has the potential to utilize three scalar changes simultaneously (hue, saturation and value), it uses these variations in a geometrically orientated color model so as to allow very efficient color rendering of individual vector orientation showing simultaneous variation in azimuth and inclination either as color coded polygons (raster images) or hedgehog renders (vector images),

While the application of hue or a specific color is a trivial matter when it is applied to scalar values, it is substantially more involved when each of hue saturation and value are modified in a meaningful cognitive manner with respect to a symmetrical orientation about any selected axial direction with limitations,

<u>and Page 6, paragraph 1 wherein,</u>

Orientation as used by Komarechka refers not only to the sense of the vector but also to the azimuth and inclination value. While a simple grid is shown on the example in the patent application, the Komarechka methodology is amenable for the application to any polygon surface, or polyhedron for that matter. Besides just indicating the coordinate location, the Komarechka methodology also facilitates the display of vector information in terms of magnitude, azimuth and inclination of all

vectors in the area or volume selected, and displays them on the scatter plot to show their relative orientation. In essence the Komarechka methodology allows for information to be easily and quickly searched and displayed by Vector Orientation or be searched by area of selection. None of the references cited indicate this facility,

<u>and Page 6, paragraph 2 wherein,</u>

The scatter plot illustration as shown Figure 10 of the present invention is a simplistic illustration used to explain the concept of the Komarechka methodology. This rendering does not claim to be unique but rather teaches of the ability to illustrate specific vector orientations both in azimuth and inclination by the use of unique user defined colors based on the color model selected.

It is apparent that the use of subtle color patterns to "enhance the visual discrimination of subtle variation" is known to those skilled in the art. The unique aspect of the Komarechka methodology is that it is easily amenable to user commands that allow this facility for constraint of both azimuth and inclination ranges. As the data to be color coded is multi-component and not just scalar values and since the methodology is capable of rapidly switching between different color models as well as constraints along selected orientations it requires significantly more code than a few lines in Open GL™.

<u>and Page 7, paragraph 1 wherein,</u>

The concept of a claim to state that the Komarechka methodology was amenable to time variations of color allows for the analysis of time varying conditions such as the analysis of time varying electromagnetic vector field data. It is agreed that such methods are known to the industry. The Komarechka methodology can also be shown as a function of frequency in the same manner as above. Additionally, Komarechka made no claim in re time variations,

and Page 7, paragraph 2 wherein,

The systems of Kerekes, Crawfis and Mueller were clearly not combined to develop Komarechka's method. Muelleur has shown the value of the use of recording the orientation of the magnetic vector field in geophysics. The Komarechka methodology was developed so as to allow for a most efficient method for illustrating these variations in orientation so as to allow for the ability to recognize uniquely orientated dipoles as well as other unique aspects of vector field data. While both Kerekes and Crawfis use color rendering for scalar properties of vectors, neither utilizes the color-coded orientation in the manner as expressed in Komarechka method.

In response to Page 8, paragraph 1,

The Komarechka methodology allows for the methodology to be easily facilitated to program development with all the capabilities of output including selected output operations.

In response to Page 8, paragraph 2,

The applicant believes the amendments to claim 1 will satisfy the allowability of claim 3.

In response to Page 8, paragraph 3,

The applicant believes the amendments to claim 1 and allowance of claim 3 will satisfy the allowability of claim 4.

And that the applicant is satisfied that these claims amendments and remarks shall indeed move that application to a state of allowability.